

REMARKS/ARGUMENTS

Claims 8 and 9 have been canceled. Claims 1-7 and 10-24 are active in the case.

Reconsideration is respectfully requested.

Applicants' representative wishes to thank Examiner Bernshteyn for the helpful and courteous interview of May 15, 2007. As a result of the discussion it is believed that the issues in the case have been clarified and that the prosecution of the case has been materially advanced.

The present invention relates to copolymers of ethylenically unsaturated acid-group-containing monomers and a hydrophobic monomer component for the prevention of the deposition of inorganic and organic deposits.

Specification Amendments

The specification has been amended in order to introduce therein appropriate section headings. Entry of the amendments is respectfully requested.

Claim Amendments

Claim 1 has been amended by limiting the terpene (b1) component to acyclic and monocyclic terpenes, and further has been amended to recite the proportion of component (b) in the copolymer as within the range of 0.2 to < 20 wt %. Support for this range can be found on page 9, lines 3-4 of the specification.

Claim 7 has been amended so that it is consistent with amended Claim 1.

Claims 13 and 17 have been amended so that they are consistent with the language of Claim 1, except that the original definition of the terpene component is retained. None of the amendments are believed to have introduced new matter into the case. Entry of the amendments into the record is respectfully requested.

Claim Rejection

Claims 1-3 stand rejected based on 35 USC 102(b) or 35 USC 103(a) as anticipated by or obvious over Krutko et al, SU Publication 1435580. This ground of rejection is respectfully traversed.

Consistent with the remarks by applicants' representative at the interview, applicants maintain that the cited and applied Krutko et al publication does not show or suggest the invention as claimed. In the discussion it was stated that Krutko et al discloses a copolymer that is prepared by the copolymerization of methacrylic acid and one of three bicyclic terpenes identified at column 1, lines 16-21 as α -pinene, β -pinene and Δ^3 -carene. Although one of the monomer components of the copolymer material of the present claims is a terpene, in fact, the present claims as amended do not include any of the bicyclic terpenes that are disclosed by the reference, but rather are limited to acyclic and/or monocyclic terpenes. Thus, the monomer formulation of the present claims is not taught or suggested by Krutko et al.

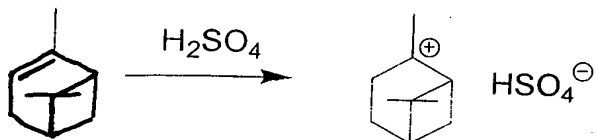
Another distinctive feature of the presently claimed water-soluble copolymer is that the amount of component (b) in the copolymer ranges from 0.2 to < 20 wt %. On the other hand, in Krutko et al the amount of methacrylic acid relative to terpene reactant ranges in weight from 3-4:1. A weight ratio of 3:1 corresponds to 75 %/25 % ratio and a weight ratio of 4:1 corresponds to a ratio of 80 %/20 %.

Yet another way in which the claimed invention is distinguished over the reference is that significant structural differences exist between the copolymer of the invention which is prepared by radical initiation and the copolymer of the reference that is prepared by a cation initiated copolymerization reaction, wherein an acid is employed as the initiator of the reaction. Normally, there are three phases to a polymerization reaction which are: (a) initiation, (b) propagation and (c) termination. In the case of the cationic copolymerization taught by Krutko et al, initiation of copolymerization occurs by protonation of an olefinic

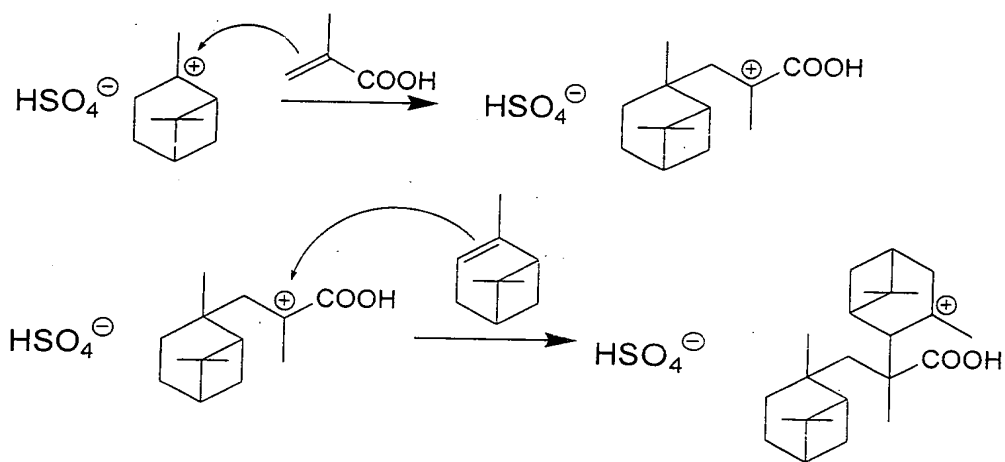
monomer according to Markovnikov's rule which yields the corresponding carbocation, which is the reactive species for the subsequent steps, propagation by recurring nucleophilic attack of an unsaturated monomer resulting in polymer chain growth, and termination by the reaction of the active cationic end of the polymer chain with a nucleophile, i.e., water. These three phases of the cationic polymerization are shown in the reaction sequence shown immediately below.

Cationic polymerization of methacrylic acid and α -pinene

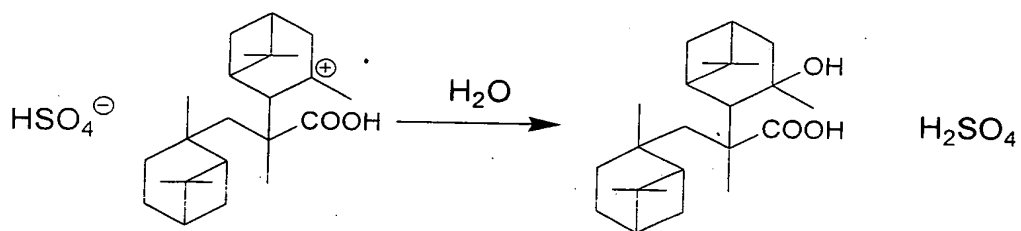
(1) Initiation



(2) Propagation



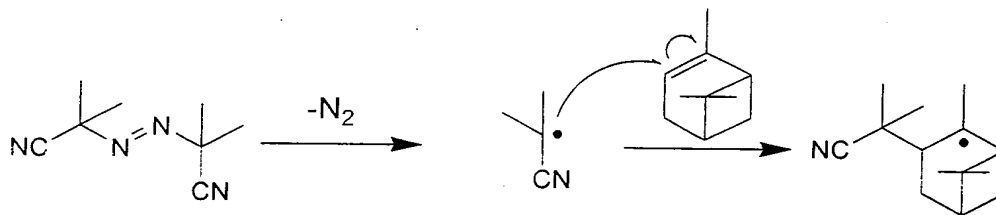
(3) Termination



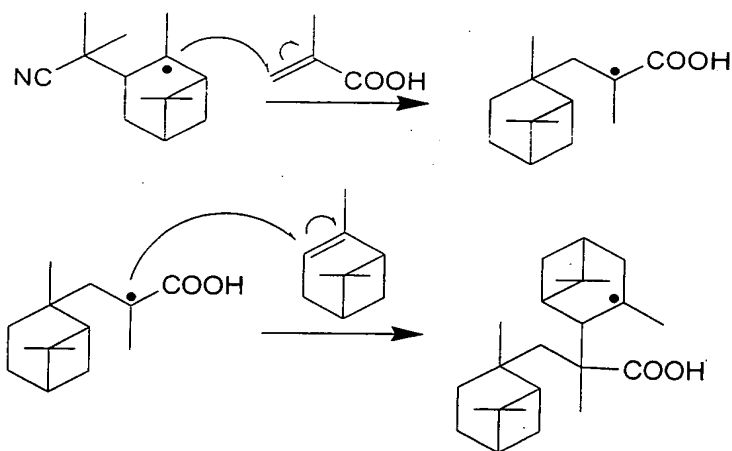
In contrast to the polymerization reaction described and shown above, the free radically initiated of methacrylic acid and α -pinene, as shown in the schematic below, requires the initial reaction of a radical species with the double bond of one of the reacting monomers so that a covalent bond is formed between the radical initiator and the reacting monomer molecule. Propagation of the growing polymer chain occurs by recurring nucleophilic attack of the radical of the growing chain with the double bond of another monomer. The reaction is terminated by disproportionation or combination of two radicals. This reaction sequence is shown by the scheme below which employs 2,2'-azobis(2-methylpropionitrile (AIBN) as the initiator.

Radical polymerization of methacrylic acid and α -pinene

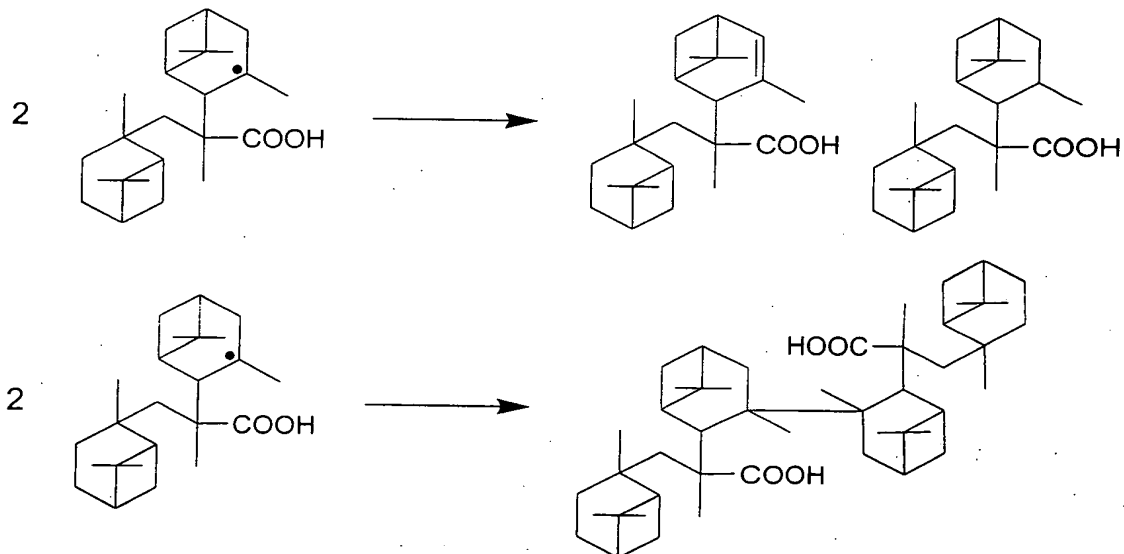
(1) Initiation



(2) Propagation



(3) Termination by disproportionation or combination



From the reaction schemes above, it is clear that the cationic polymerization reaction taught by Krutko et al and the radical polymerization reaction employed in the present invention produce two distinct polymer products. The product obtained by cationic polymerization at the initiator terminus simply starts with a protonated monomer species, while the initiator terminus of the polymer is a portion of the initiator molecule which is bound to one of the carbon atoms of the double bond of a reacting comonomer. At the termination end of the cation initiated polymer, the nucleophile water reacts with the cationic site in the polymer chain, thereby forming a hydroxyl group on the terminating end of the polymer while in the radical initiated polymer, termination occurs by combination of two polymers having radical sites or by disproportionation of two radical bearing ends of two polymer chains.

It also should be noted that in Krutko et al, the copolymer obtained is a white or yellowish solid mass which can be pulverized for its dissolution in water and ethanol. By contrast, the polymer that is formed can be directly used without isolating the polymer. Thus, steps of isolating a polymer, pulverizing the polymer and dissolving the copolymer in water is avoided in the practice of the present invention. Clearly, the invention as claimed is patentably distinct over the reference and withdrawal of the rejection is respectfully requested.

Claims 1-21 stand rejected based on 35 USC 102(b) or 35 USC 103(a) as anticipated by or obvious over Werres et al, WO 95/ 15296. This ground of rejection is respectfully traversed.

The Werres et al reference is of comparative secondary interest, because the reference only discloses oil-in-water emulsions for the prevention of slime formation and inhibition of microbes in water carrying systems. The emulsions are formulated of the likes of saturated or unsaturated isomeric hydrocarbons, saturated or unsaturated fatty alcohols or fatty acids,

esters of saturated or unsaturated fatty acids with polyalcohols, an acyclic, monocyclic or bicyclic terpene, or the like. Not only does the reference not describe an emulsion of a polymer material from the monomers described in the present claims, it does not describe a polymer prepared by radical polymerization. It only describes a physical mixture of single non-polymeric molecules in an aqueous medium. Moreover, many of the molecules types that are disclosed can not be radically polymerized, and in the case of the terpenes described, the reference does not disclose whether the terpenes contain olefinic double bonds.

As to the matter of utility, the reference only discloses that the emulsions described therein can be used for the prevention of slime formation and inhibition of the proliferation of microbes. No other uses are disclosed. Thus, uses of the emulsions of the reference beyond what is described is mere speculation. Accordingly, the Werres et al reference does not show or suggest the invention and withdrawal of the rejection is respectfully requested.

Claims 22-24 stand rejected based on 35 USC 103(a) as obvious over Krutko et al in view of Behr et al, U.S. Patent 5,756,624. This ground of rejection is respectfully traversed.

It is noted that the Behr et al patent discloses the use of a polymer based on a terpene monomer as a textile sizing agent. However, while the patent discloses a copolymer that is formed by copolymerizing a terpene compound with an unsaturated mono- or dicarboxylic acid and a vinyl-type comonomer, the scope of terpene compounds disclosed by the patent is not limited to the acyclic or monocyclic terpenes of the present claims and the patent does not appear to disclose an unsaturated, open-chain or cyclic, normal or isomeric hydrocarbon with 8 to 30 carbon atoms as a comonomer. Further, although the patent discloses the polymerization of monomers by radical polymerization, it does so in the bulk, not in the form of an oil-in-water emulsion. Accordingly, the Behr et al disclosure does not improve upon the disclosure of Krutko et al so as to render the presently claimed invention obvious.

Withdrawal of the rejection is respectfully requested.

Appln. No. 10/517,614

Reply to the Office Action of February 8, 2007

It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.


Respectfully submitted,

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